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CONTROLLER

MANUAL FOR THE AMIGA-VERSIONS

2ND GENERATION ADVANCED FLOPPY CONTROLLER

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Installation of the controller

You should only install the controller on your own if you have experience in installing hardware upgrades. If you don't dare to do it on your own, your service partner will help you.

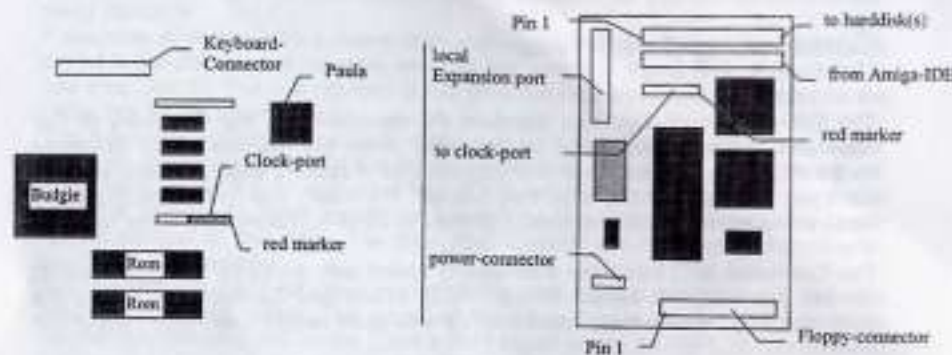
Installation in the A1200 on the IDE-port

For this way of installation a cable is necessary that is not shipped with the Catweasel. It's a standard 2,5" -> 3,5" IDE cable. If you have such a cable, follow the instructions on installing the controller to the IDE-port in the A4000. The local expansion slot on your Catweasel MK2 will be inactive with this way of installation, so you should consider installation on the clock-port.

Installation in the A1200 to the Clock-port

We strongly recommend using the clock-port for installing your Catweasel controller. Using this port, the local expansion slot is usable, and the compatibility to standard 4-way adapters is given (e.g. IDE-fix 97 interface). Using such a buffered adaptor is recommended if you're using a cable that's longer than 30 cm (12 inches) or if you're using more than one IDE-device.

First, connect the 22-pin cable to the clock-port of your A1200. The red marker on the cable must face to the right, towards the 150-pin connector. Then, connect the other end to the Catweasel controller with the red marker facing to the MACH-chip (the square chip, see figure!). The power-connector can be used for additional power supply, but it shouldn't be necessary.



Not every A1200 has got a clock-port. You can identify a clock-port by a 22-pin pinheader installed in P9B facing towards the 150-pin connector. Other (very uncommon) versions of P9B are: The connector faces towards the harddisk, the connector has got 40 pins, or there's no connector at all. In all these cases, your service partner will help you.

Installation in the A4000 to the IDE-port

Use the 40-pin cable that's shipped with the controller for connection to the IDE-port. The red marker must face to pin 1 of the port, in A4000 desktop versions this is „towards the power supply“. On your Catweasel controller, pin 1 faces towards the local expansion connector.

For power supply, there's a Y-style adaptor shipped with the controller. Just plug the „small“ end to the power-connector of the Catweasel, and the other end to a free connector of the power supply. The second output of the adaptor (5,25" connector size) can be used for a harddisk or a CD-ROM drive.

Installation of the Zorro-II version

Plug the card into a free Zorro II or Zorro III slot of your computer. Mind the correct orientation of the card: The three IDE-ports must face to the front of the computer, and the 26-pin local expansion port must face to the back. The parts of the controller must face towards the diskdrives in A2000 systems, and they must face up in A3000/4000 desktop computers.

The new Z-II cards are designed not to be connected the wrong way in standard-computers.

Remark: Proper function of the Z-II Catweasel is only guaranteed with commodore-computers. The Zorro-signals are not generated by a buster-chip on Zorro-expansions for the A1200, so adaptation of the Zorro-expansion may be necessary. Please contact the vendor of the expansion for the adaptation.

The new Zorro-II versions of the Catweasel („S-Class cards“) should fix most problems with these expansions. Especially if the Zorro-PCB is connected with cables to the A1200, there are reflections on the bus that can't even be eliminated by our bus technology on the new Zorro-cards. However, it has been reported that configurations with these kinds of expansions work fine.

Connecting diskdrives

The Catweasel controller uses standard PC-diskdrives, it's not necessary to buy expensive Amiga-HD diskdrives. Unfortunately, there are very low-quality diskdrives on the PC market. These drives are only capable of reading data (installing drivers), but if you want to write to a disk, they just fail. The tracks that have been written by these drives normally lose all data, and need to be re-formatted by a better drive.

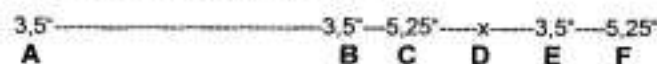
The Catweasel MK2 has been successfully tested with drives by Teac, Panasonic, Chicony, Sony, Namki, Sanyo, Sanyo, NEC, Epson and Control Data. During our tests, the TEAC drives have convinced us with good results even when using bad disks.

Caution:

Due to our tests, we can't guarantee the function with Mitsumi diskdrives. This applies to both, 3,5" and 5,25" drives. However, we can't completely exclude proper function.

Use the floppy-cable that's shipped with the controller for connecting the diskdrives. It's different from Amiga floppy cables, because it uses a certain standard to twist some wires that's different from the „twist“ in the Amiga-cables. Being compatible to this standard, you'll find spare parts or longer cables much easier and cheaper.

The cable has got five connectors:



- A: Connector for the controller
- B: Connector for a 3,5" diskdrive as unit 0
- C: Connector for a 5,25" diskdrive as unit 0
- D: standard-twist in the cable
- E: Connector for a 3,5" diskdrive as unit 1
- F: Connector for a 5,25" diskdrive as unit 1

Remark: In some cases the connectors B and C / E and F are swapped.

Please mind that you can only connect one drive as unit 0. Physically it's possible to connect a 3,5" drive to B and a 5,25" drive to C, but the Catweasel will fail in this configuration. The same applies to connectors E and F.

Jumpers of the diskdrives

Normally, you don't have to change the jumpers of the diskdrives. New drives don't even have jumpers any more, because a standard has been established for the PC-drives. The Catweasel is compatible with that standard, so you can connect almost every diskdrive.

If you have docs about the jumpers of your drive, set the jumpers to a position where pin 34 is diskchange and the drive answers the „select 1" signal, even if you want to use it as „unit 0". The unit number of the drive only depends on the position on the cable, not on the select-signal.

The Panasonic-diskdrives in A1200 computers by Amiga Technologies (the „magic" set) have got a small switch on the bottom of the PCB. This switch must be set to „0" if you want to use the drive in an Amiga 1200, but it must be set to „1". Be careful with that switch, it's mechanically very delicate. The diskchange signal is in the correct position on that drive. The drive JU-257A805P can be used as HD-drive on the Catweasel controller.

Amiga-diskdrives can't be used on the Catweasel without modifications, because they differ in some details: The pinout of the drives has been changed in order to have a diskchange-signal on pin 2 and a RDY signal on pin 34. On 5,25" drives, even the rotation speed is changed to 300 RPM, different from the standard for 5,25" drives, which is 360 RPM.

If you want to use a diskdrive on the Catweasel that is configured to work on the internal Amiga floppy-controller, check the following points:

1. diskchange must be available on pin 34
2. the drive must answer to the „Select 1" signal
3. 5,25" drives must spin at 360 RPM

3,5" drives always spin at 300 RPM, so you don't have to worry about the speed of these drives.

HD-drives that have been designed for the internal floppy-controller of the Amiga can't be used on the Catweasel at all. These drives spin down to 150 RPM as soon as a HD-disk is inserted, so these (very expensive!) drives would only reduce the speed of your controller.

The easiest way of finding a drive that works properly with the Catweasel is buying a new PC-diskdrive. Especially if you have to change the rotation speed of a 5,25" drive without having the docs about jumpers, you won't be very lucky at all.

Installation of the software

The installation of the drivers for the Catweasel is done by the installation script on the disk. Just insert the disk into an Amiga-diskdrive (the Catweasel drives don't work yet!) and double-click the `install_me` icon. If your computer doesn't have a diskdrive (any more?), you can download the drivers directly from the vendor's mailbox: +49 241 12099 (will automatically detect analog V.everything/digital X.75 call). Most of the words in that mailbox are German - maybe your reseller has also got a mailbox with the drivers online. The vendor's web site is www.jschoenfeld.com, and a copy of that site can be found on <http://home.foni.net/~amiga>. Due to the large amount of data, only a few files are available on the web site. If you need the whole disk, call the mailbox.

If you want to run the installation script without the disk, you must first issue the command

```
assign Catweasel: <pathname>
```

in a Shell¹ where `<pathname>`, is the path with the unpacked files of the Catweasel-disk. If you're running the installation script off the disk, this command is not necessary.

Start the installation script by double-clicking the „Install_me“-icon and answer the questions you're being asked. After this procedure, the software is installed as you wish. During installation you'll be asked if you want a dosdriver to be mounted directly after bootup, or if you want to mount it later. This is done in order not to have a pile of XXX:????-icons on the workbench screen every time you insert a disk. If this doesn't disturb you, you can mount the drives directly after bootup. You can mount a drive later by entering

```
mount <drivename>:
```

in a Shell². With the command `mount th0:` you'll mount a trackdisk-1,76 MB disk for example.

¹ See appendix: how to open a shell

² See appendix: how to open a shell

Using the Catweasel-drives

The drives on your Catweasel are *not* referred to as `dfx:`³. There's a name for every diskformat that you're going to use. The names are:

TD0, TD1	Amiga-DD-disks in 3,5" drives (880 Kbytes)
TH0, TH1	Amiga-HD-disks in 3,5" drives (1760 Kbytes)
PD0, PD1	MS-Dos-disks in 3,5" drives (720 Kbytes)
PH0, PH1	MS-Dos-disks in 3,5" drives (1440 Kbytes)
OH0, OH1	MS-Dos-disks in 5,25" drives (1200 Kbytes)
EX0, EX1	XTRA-HD disks in 3,5" drives (2380 Kbytes)
CBM0, CBM1	Commodore 1541-disks in 5,25" drives

Macintosh 1440KByte-disks in Catweasel drives are supported directly by the Shapeshifter V3.7 and up. Please read the readme-file for support of Mac 800 Kbytes disks.

AmigaDos Versions

To use the Catweasel drives, you need at least Workbench version 2.1 or higher. Further, Commodore has made some mistakes when „updating“ some files, so there occurred some bugs during our beta-tests that are not caused by the Catweasel software. Here are three things where multidisk.device can't work around without your help:

The copy-command V38.x sometimes trashes target data, so it should be replaced by a newer one (version 40.x or higher).

CrossDosFilesystem V41.x only „asks“ mfm.device for a diskchange, so the filesystem won't recognise when you're removing a disk from a catweasel drive. Either use CrossDosFilesystem V38.x, or use the patch from the utilities-directory of the Catweasel disk. For a description of this program, see „contents of the disk“.

Oldfilesystem/FastFilesystem of the 3.0 and 3.1 ROM's make enforcer hits if you're entering a MaxTransfer value of 0x80000000, that means your computer crashes without any visible reason. Just don't use this value, it doesn't even make sense: Who can transfer 2GBytes off a floppy disk?

³ possible change on Z-II controllers with bootrom, see readme-file on the disk!

The Dosdriver files

You can also make the files in the directory DEVS:Dosdrivers on your own, here's an explanation of the lines in these files. The information in these files is only passed over to the filesystem, not to the device. They must comply with the physical dimensions of the disk, otherwise you will get a lot of errors. In some cases, the filesystem replaces information from the mountlist by information from the GetGeometry() function of the multidisk.device, so with certain filesystems some lines in the mountlist may be overwritten. You can't change the physical dimensions of the disk by changing the mountlist. For a list of formats you can use see explanation of the FLAGS field.

Device = multidisk.device

This is the name of the exec-driver. The exec-driver is the interface to your Catweasel Controller. Every software that wants to access Catweasel-drives opens this driver.

Unit = 0

This tells the device which drive to use.

Flags = 0

This is probably the most important line in the file, because with this number you're telling the multidisk.device what type of disk you want to access. Programmers should know that the Flags-field of the mountlist is the same number as the openflags* for multidisk.device. Programmers should look at the text-files in the developers* directory on the disk.
Available diskformats are:

for 3.5" diskdrives spinning at 300 RPM:

0 Amiga DD	880 Kbytes	double-sided
1 Amiga HD	1760 Kbytes	double-sided
2 MS-DOS DD	720 Kbytes	double-sided
3 MS-DOS HD	1440 Kbytes	double-sided
4 Atari 10 sector*	800 Kbytes	double-sided
5 Atari 11 sector	880 Kbytes	double-sided
6 Commodore 1581	800 Kbytes	double-sided
7 XTRA high density	2380 Kbytes	double-sided
8 MS-DOS HD 20 sector	1600 Kbytes	double-sided
9 Macintosh DD	800 Kbytes	double-sided
10 Macintosh DD	400 Kbytes	single-sided

please look at the readme-file on the disk for latest information.

for 5.25" drives spinning at 360 RPM:

16 Commodore64 1541	170 Kbytes	single-sided
17 MS-DOS HD	1200 Kbytes	double-sided
18 MS-DOS DD 40 Track	360 Kbytes	double-sided
19 Amiga DD	880 Kbytes	double-sided
20 MS-DOS DD 80 Track	720 Kbytes	double-sided
21 MS-DOS DD	180 Kbytes	single-sided
22 Apple IIe	140 Kbytes	single-sided
23 Atari 800 XL	130 Kbytes	single-sided
24 Atari 800 XL	180 Kbytes	single-sided

Other numbers will return an error (error on OpenDevice()).

Multidisk.device can't check the type of the drive. It doesn't even check the presence of a drive, so it's up to you to choose the correct unit number and the correct flags number. Choosing wrong numbers will simply cause a lot of unreadable disks.

Surfaces = 2

This is the number of read/write heads accessing the disk. You *must* enter the correct value here, otherwise your disk will have a wrong size, and formatting such a disk may destroy data! Please look at the table above for the correct number of surfaces.

BlocksPerTrack = 11

This is the number of datablocks on a track. Mind the difference between a track and a cylinder: A track is always associated with a full revolution of the disk accessed with one read/write head. A cylinder is associated with a full revolution accessed with all the heads available, therefore the number of blocks per cylinder is $Surfaces * BlocksPerTrack$, so in this case you have 22 datablocks on a cylinder.

Reserved = 2

This is the number of blocks that shall not be used by the filesystem from the beginning of a disk. The two blocks of the Amiga 880K-disk are reserved for the bootblock. If you'd choose this value too small, you might destroy data on the disk by using the install command. It's better to change this value only for testing purposes.

mask = 0x7ffffc

This value is a bit difficult to understand. If multidisk.device receives the command to transfer data, this value is a logical AND-mask for the start-address. The idea is to reduce hardware requirements when designing a DMA controller if you can rely on the lower address bits being zero. The Catweasel only accesses it's own memory directly, so this value isn't really important. We have set the upper bit to zero because the Amiga uses a 31 bit address space. The lower two bits are set zero to make the start-address longword-aligned, so the performance of the controller is always the same.

MaxTransfer = 0x00200000

This is an addendum to the mask-value. The parameter defines the largest block to be transferred at a time. Again, this can be used to simplify a DMA hardware design or to forbid too large DMA transfers. The catweasel software can access all of the Amiga memory and the size of a block can be as big as you want. Due to disks not being larger than 1,76MB at the moment, the given value (2MB) is more than large enough.

Interleave = 0

Interleaving is a very old technique to increase the performance of a mass storage medium. The idea is to place some blocks that are not needed at the time between two blocks that are read successively. During the time the „at the moment not interesting“ blocks are passing, the data can be transferred to the computer. After the transfer is finished, the next block is „near“, so idle times are reduced to a minimum. The Catweasel controller is a product of the 90's, it always reads a complete track at a time. The interleave-value is only used by the filesystem, but a change will not alter any speed ratings.

LowCyl = 0, HighCyl = 79

These are the physical borders of the disk. Values between 0 and 79 are allowed. Some diskdrives allow positioning the read/write heads to higher tracks than 79, but other drives are damaged by this command, so we decided to introduce these borders to protect your hardware.

Buffers = 5

This is the number of buffers in memory. The last accesses to the disk are stored in these buffers to increase the speed if the same blocks are read again.

BufMemType = 1

With this value, you're telling the filesystem what type of memory to use for the buffers. There are three choices:

- | | |
|-----------------|---|
| 1= Any (public) | Uses any memory that's non-virtual, beginning with the highest priority memory. |
| 3= Chipmem | The graphics and sound-memory of the Amiga system is rather slow compared to fastmem performance, so using chipmem doesn't make any sense. |
| 5= Fastmem | This is the default value. Fastmem is memory that can only be accessed by the CPU, therefore it's the fastest memory available in the system. |

Stacksize = 4096, Priority = 5

Every process in the Amiga OS has got its own Stack and priority, you can enter the values here. The values are perfect for multidisk.device, you shouldn't change them.

Activate = 1

If you enter this line, your dosdriver is activated directly after mounting and the catweasel drive starts clicking. If you leave out this line, the drive is not activated until it's referenced directly, for example by changing the current directory to this drive in a shell.

Contents of the disk

Your Catweasel installation disk contains the following files:

devs/multidisk.device

The exec-driver itself, it will be copied to your DEVS: directory by the installation disk.

devs/mfm.device

This is a replacement for the mfm.device shipped with the Amiga OS. It re-directs accesses to mfm.device to multidisk.device thus making programs using the mfm.device compatible to the Catweasel controller. You can choose the type of disk by the unit number you open: Units 0 and 1 access PC-HD disks in Catweasel drives 0 and 1. If you want to access PC-DD disks, use Unit numbers 2 and 3, where Unit number 2 accesses a DD-disk in Drive 0, and Unit 3 accesses a disk in drive 1.

Caution: The only way to recognise this „redirection device“ is the filesize. Programs can't decide whether they're working with the real mfm.device or with this replacement, so this may cause confusion. Unfortunately, not every emulator uses mfm.device to access PC-disks, so this device won't solve all compatibility problems. Most of the times, it'll be necessary to write a letter to the programmer.

l/1541-handler and l/1541-handler.68030

This is the filesystem for easy access to C-64 disks. The version optimised for your CPU will be copied to your L: directory by the installation script. Please read the file „changelog“ in the L: directory for latest information and 1571-disk support.

Beta/BootCat

Please don't use - if you want to boot, consider buying the Kylwaide bootadapter!
 A program to make Catweasel unit 0 bootable. It will set itself reset-proof and patch a few system routines to accomplish this. If you have more than 2 floppies connected to the standard floppy connections, df2 and df3 will disappear after reset. It will mount TD0: and TH0: This program can only be run from a Shell. See also *Utilities/FreeSystem*.

Prefs/multidisk

The preferences-program for multidisk.device is self-explaining. The sliders for the step-rate are only meant for older 5,25" drives that can't handle the standard-step-rate of 3ms. This program will be copied to your prefs-directory by the installation script.

Utilities/ModifyCrossDos

Due to a bug in CrossDosFilesystem, the filesystem will not detect diskchanges on any device other than the ones that existed when it was programmed. This program will modify it in a way that it will work with multidisk.device, but after modification, it will no longer work with mfm.device. You should make a safety-copy of the original file, because this program doesn't do this. Start this program only once.

Utilities/TrackWindow

A small tool, that opens a window allowing you to see the head-position of the floppies controlled by multidisk.device Use a parameter '0' or '1' to set the unit-number. It will end by clicking the window's close-gadget. If you wish to start it from a shell without loosing control of that shell, use

```
run TrackWindow 0
```

Utilities/FreeSystem

A handy little tool that removes all pointers to any type of reset-proof structure in RAM. This includes reset-proof drivers like BootCat, the recoverable RAM-disk and viruses. A reset after executing this will start a clean system.

Testroutines/TestCatweasel

This tool tests the controller and a 3,5" drive connected as unit 0. First, the controller's memory is tested, then two cylinders of kickstart data are written to a DD-disk inserted in unit 0, afterwards the data is verified.

Caution!

TestCatweasel doesn't prompt you to change disks, so you are responsible for the disk in unit 0. Data on this disk will be destroyed!

If the disk is write-protected, it won't be harmed at all.

mountlists:

There are several mountlists in the Devs/DosDrivers drawer. To support different diskformats, you will need different mounts. Please note that there will be more than one mount to one physical drive, but the system will not notice that. Formatting a PC-disk in PD0: will loose a disk in TD0:, since that is one single disk, you are just changing formats. A disk inserted will be tested by all mounted drives. One will detect the format and show up with an icon. The others will report an unreadable disk. This is normal and should not be considered as a bug (Amiga OS has the same habit with DF0: and PC0:).

Please mind the correct drivetype when making your own mountlists, because the drivetype can't be identified by the controller. If you're using a mountlist for 3,5" drives on a 5,25" drive, you may experience funny errors. Reading disks may be possible, but writing to disks may destroy data without a chance of restoring it!

Back-sides of 1541-disks

You may have noticed that a standard PC-drive can't read the reverse-sides of 1541-disks (we all flipped the disks, didn't we?). This should not be considered as a bug, because the standard PC-diskdrives need the index-hole to check whether the disk is spinning or not. If you flip the disk, the index-hole is in the wrong position, and the drive doesn't recognise the disk's rotation, therefore it won't enable the data line. Only the „boeder“ disks had a second index-hole, these disks can also be used on the B- side with PC-drives.

If you want to read the reverse sides of your 1541-disks, ask your local dealer for modification sets for 5,25" drives, or for modified drives.

Appendix

How to open a shell

A Shell or a CLI (= command line interface) is a window on the Amiga's workbench. In this window you can start commands, just like in MS-DOS™. You can find the Shell-icon in the system-drawer of the workbench, just double-click the icon and the window will show up.

If you're not used to using the Shell, take a look at the „Amiga DOS“ manual of your Amiga. This manual is shipped with all Amiga-systems and OS upgrade kits. If you don't have the new Kickstart manuals, look at chapter 6 of the Workbench 1.3 manual. Please understand that we're unable to give an introduction to using the shell here, as this would go beyond the scope of this manual.

Service

If you have any problems with your Catweasel controller - concerning installation, malfunction or returns - the first place to go is your retailer.

Just in case adequate help cannot be provided locally, you may directly contact the developers:

Achim Dahlhoff, Aachen, Germany

e-mail: sunshine@nostlgic.oche.de

responsible for: All the software for the Catweasel: multidisk.device, the Prefs-program, the replacement-mfm.device, and the small tools on the disk.

Jens Schönfeld, Aachen, Germany

e-mail: sysop@nostlgic.oche.de

responsible for: The idea of the Catweasel, the hardware design, co-ordination of production, retailer management, and this manual.

Michael Krause, Hamburg, Germany

e-mail: rawstyle@ms.demo.org

responsible for: the 1541-file system on the disk.

Credits

One of the most important topics in this manual, because there are many people who supported my idea since the very beginning. There's no special order in the list.

Achim „Sunshine“ Dahlhoff for the Amiga-software

Tobias „Simba“ Haustein for the PC-drivers

Daniel „Roogun“ Frey for beta-testing the first series-Catweasel (ISA-card)

Thomas „Bughunter“ Lewandowski for excessive beta-testing of the ISA-card

Thorsten „Ovaron“ Schaaps for some ideas and beta-testing of the ISA-card

Stephan „Stylon“ Kanthak for linux-drivers based on Alpha AXP (ISA-card)

Michael „Plasm“ König for some ideas in the developer conference

Colin „Albatros“ Hirsch for Intel-based linux-drivers (ISA-card)

Michael „Rawstyle“ Krause for his licenses

John „Graham“ Selck for beta-testing the combination Catweasel+1541-file system

Christian „Cebix“ Bauer for adaptation of the Shapeshifter (Amiga versions)

Martin Korndörfer for adaptation of Diavolo-Backup (Amiga versions)

Holger Schupp for graphics and design (logos and stickers)

Chris Hülsbeck for promotion on his homepage and cool music

Norbert „Norb“ Haley for promotion on his homepage and introduction of the Catweasel in New Zealand.

The participants of Scala-Meetings in Stade/Germany,
especially Dierk „Chaos“ Ohlerich

Jeremy Moskowitz for the Apple IIe documentation

Tobias Seiler for some help in decoding the Mac 800K disks

Alan Redhouse for interface ideas

and last not least Vera Henkelmann for moral support.

I hope I didn't forget anybody!